Introduction to Web Kit Development

Session 128

These are confidential sessions—please refrain from filming or taking pictures.

Application Technologies

Introduction to Web Kit Development

Chris Blumenberg
Software Engineer

http://developer.apple.com/wwdc2005/

What You'll Learn

- What is Web Kit?
- What can be done with Web Kit?
- Answers to common questions

What is Web Kit?

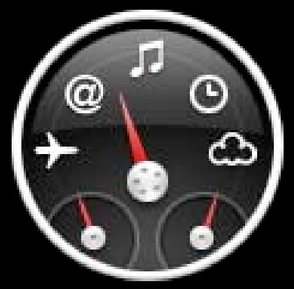
N
NE
NW
E
W
SE
SW
S

What Is Web Kit?

- A framework
- Displays web content
  - HTML
  - Images
  - Plug-ins: Flash, QuickTime, etc.
- API for WebCore and JavaScriptCore

It’s Open Source

So what can be done with Web Kit…



Dashboard

Colloquy

Dictionary

Contribute

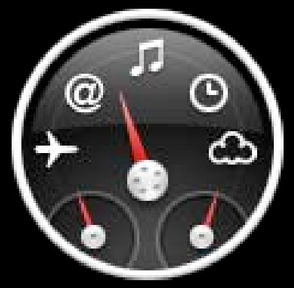
Safari

BumperCar

KidsBrowser

NetNewsWire

Mail



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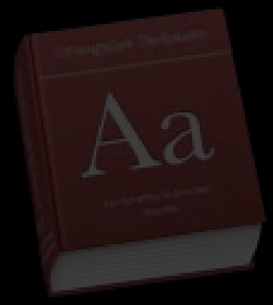

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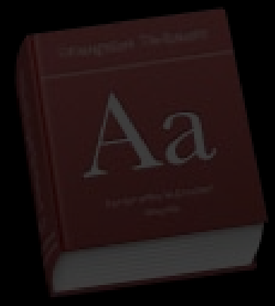

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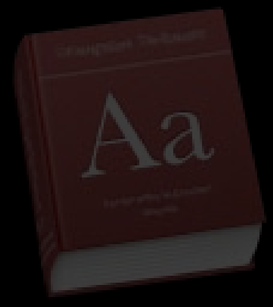

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It’s not just about browsers anymore.

Developers ask a lot of questions…

How Can I…

Create a WebView?

Make a progress bar work with a WebView?

Change what happens when a link is clicked?

Add a context menu item?

Enable editing?

Print web content?

Load content from memory into a WebView?

Make a URL field update as I follow links?

Prevent WebView from loading certain URLs?

Customize dragging?

Prevent selection?

Save web content to disk?

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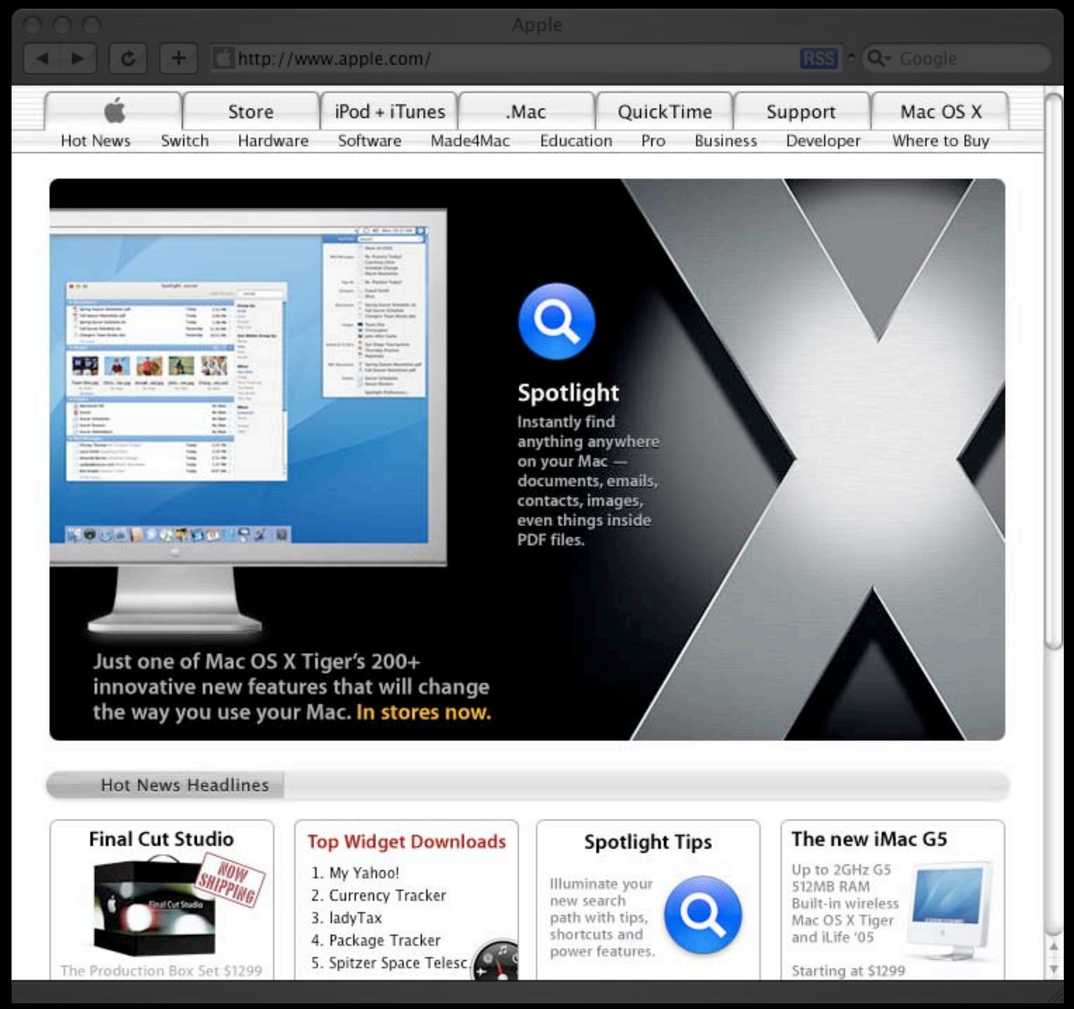
WebView

- Web Kit's main view class
- Everything but the chrome in Safari



Creating a WebView

- From Interface Builder
- From code
  - Objective-C API
  - C API

Code Example

Create a WebView

```
// Create a WebView.
NSRect frame = [contentView bounds];
WebView *webView = [[WebView alloc] initWithFrame:frame];

// Add the WebView to the view hierarchy.
[contentView addSubview:webView];
```

Code Example

Create a WebView from Carbon

```
// Create a WebView.
HIViewRef webView;
HIWebViewCreate(&webView);

// Get contentView of window.
HIViewRef rootView = HIViewGetRoot(window);
HIViewFindByID(rootView, kHIViewWindowContentID, &contentView));

// Set webViews bounds to contentViews bounds.
HIViewGetBounds(contentView, &bounds);
HIViewSetFrame(webView, &bounds);

// Add the webView to the view hierarchy.
GetRootControl(window, &root);
HIViewAddSubview(root, webView);
```

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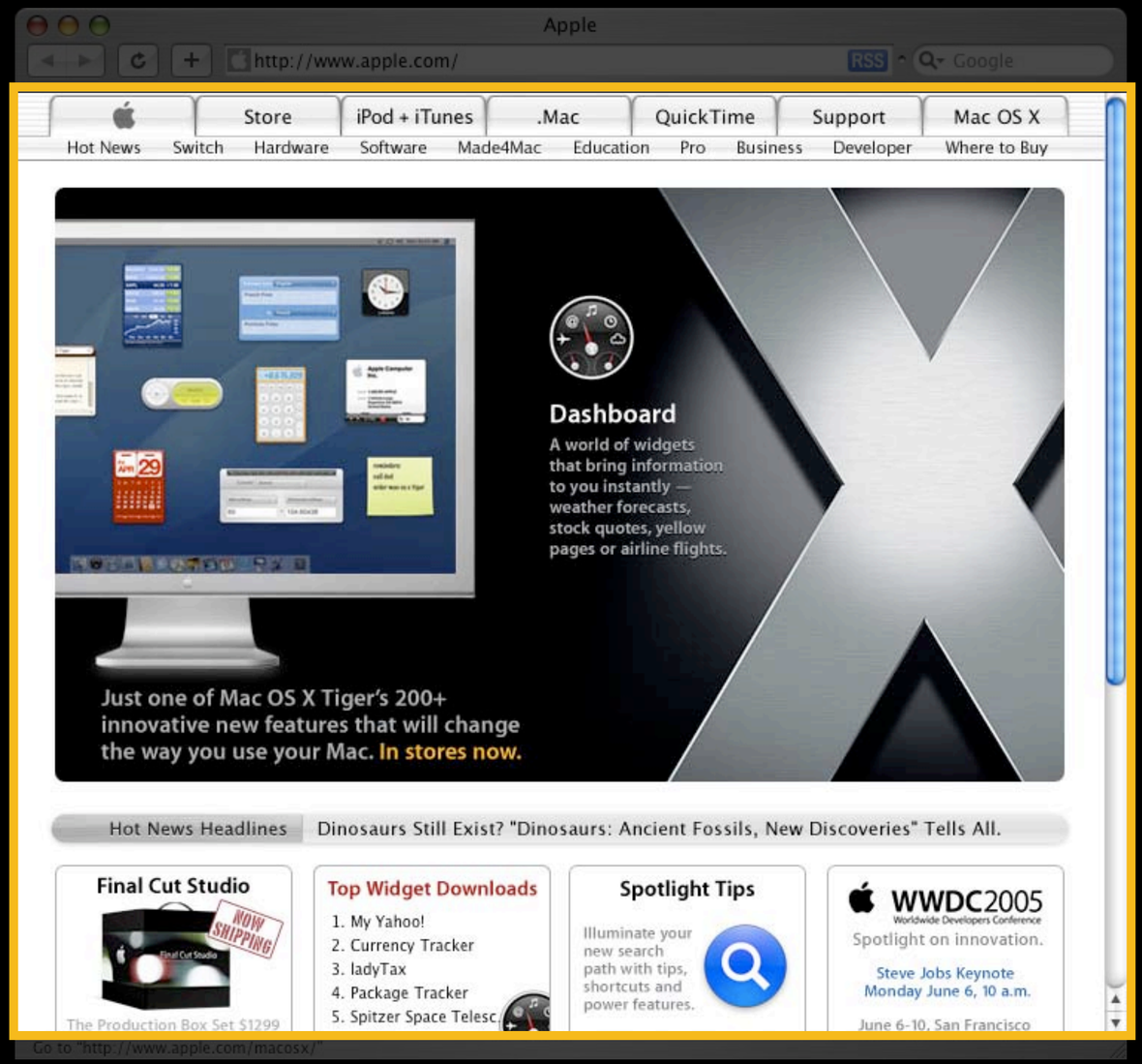
WebFrame

- A WebView has one or more WebFrames
- Manages the load
- Holds data with WebDataSource
- Displays with WebFrameView



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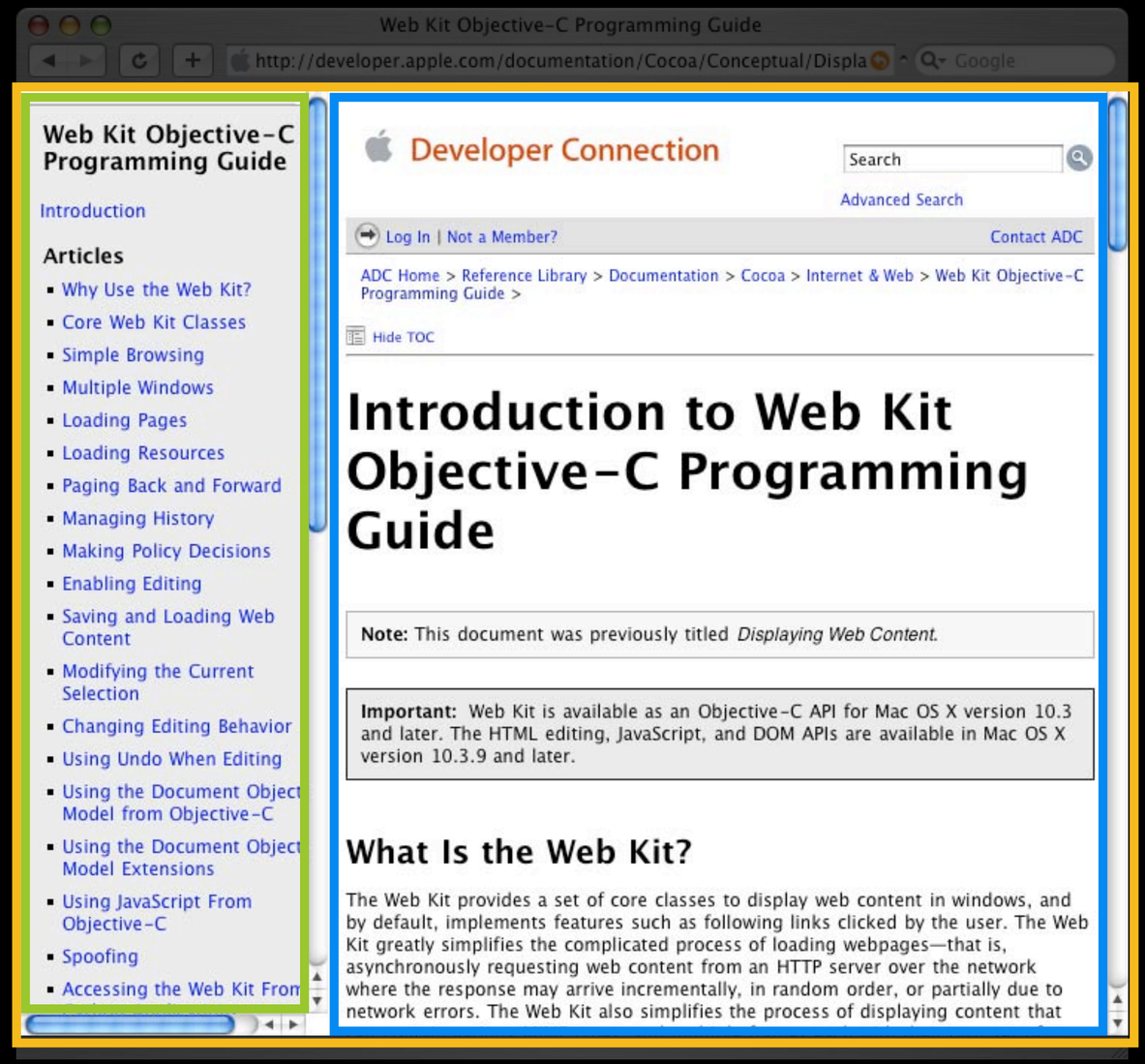

Loading in a WebView

- Initiated on WebFrame
- Content types
  - NSURLRequest
  - NSString
  - NSData
  - WebArchive
- From Interface Builder

Code Example

Load content from memory with NSData

```
// Check if WebView can handle the MIME type.
if (![WebView canShowMIMEType:MIMEType]) {
    return;
}

// Get the main frame for the WebView.
WebFrame *mainFrame = [webView mainFrame];

// Load data into the main frame.
[mainFrame loadData:data
           MIMEType:MIMEType
   textEncodingName:textEncoding
            baseURL:nil];
```

Code Example

Load content from a location using NSURLRequest

```
// Get the main frame for the WebView.
WebFrame *mainFrame = [webView mainFrame];

// Load a URL into the main frame.
NSURLRequest *request = [NSURLRequest requestWithURL:URL];
[mainFrame loadRequest:request];
```

Demo

Creating a WebView from Interface Builder

Kevin Decker
Intern Extraordinaire

http://developer.apple.com/wwdc2005/

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Tracking Progress

- WebView sends notifications when the load has
  - Started
  - Updated
  - Finished
- estimatedProgress method

Code Example

Tracking progress

```
NSNotificationCenter *center = [NSNotificationCenter defaultCenter];

// Observe WebViewProgressStartedNotification
[center addObserver:self
           selector:@selector(progressChanged)
               name:WebViewProgressStartedNotification
             object:webView];

// Observe WebViewProgressEstimateChangedNotification
...

// Observe WebViewProgressFinishedNotification
...
```

Code Example

Tracking progress

```
// Progress changed notification method
- (void)progressChanged
{
    double estimatedProgress = [webView estimatedProgress];
    [progressBar setDoubleValue:estimatedProgress];
}
```

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Delegates

- Web Kit behavior controlled by delegates
- Delegates respond to Web Kit informal protocols
- Methods optionally implemented
- Set on WebView

Provisional and Committed

- After a WebFrame load is started, it is “provisional”
- Once data is received, the load is “committed”
- WebFrame has two WebDataSources
  - Provisional WebDataSource
  - Committed WebDataSource

Provisional

Committed

Provisional

WebFrameLoadDelegate

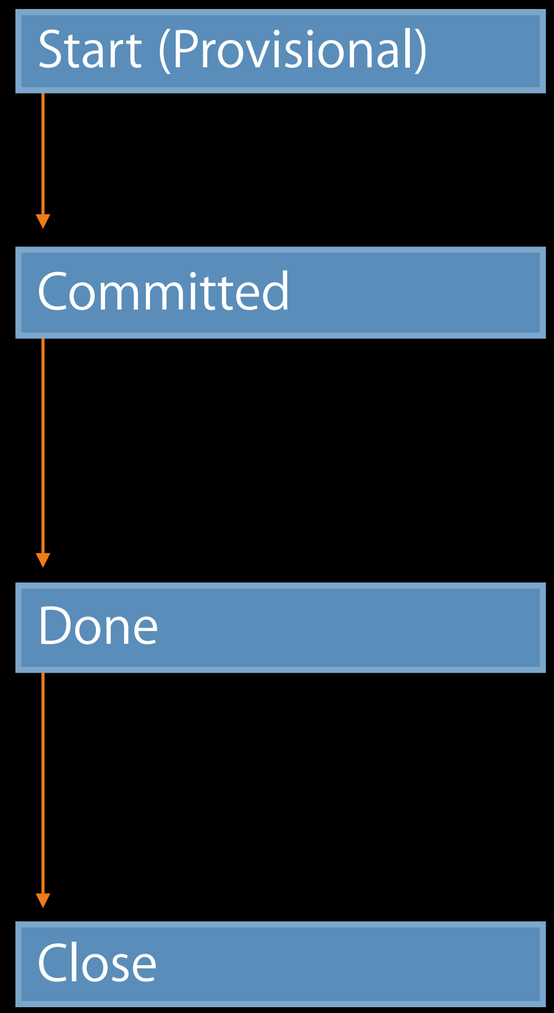
- Informed when a load
  - Has started in a WebFrame (provisional)
  - Has redirected
  - Becomes committed
  - Has finished or failed

WebFrameLoadDelegate

- Also informed when
  - Page title or page icon received
  - Page scrolled to anchor
  - JavaScript is ready

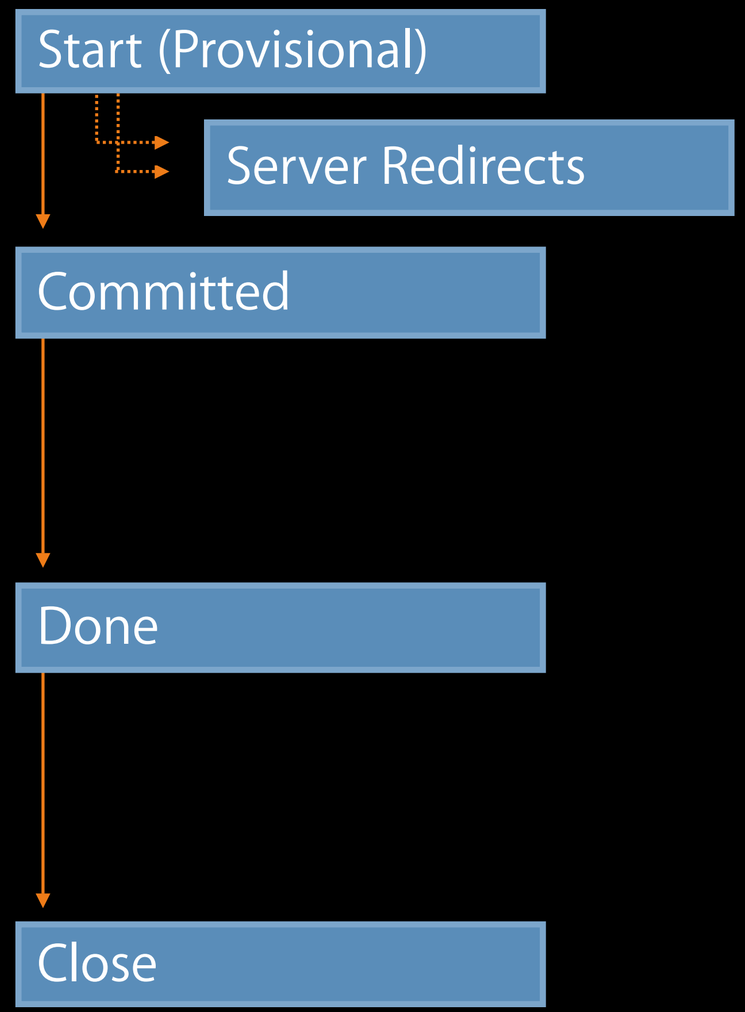
WebFrameLoadDelegate Sequence

- Tracks load progress of a document
  - Start (provisional)
  - Committed
  - Done
  - Close



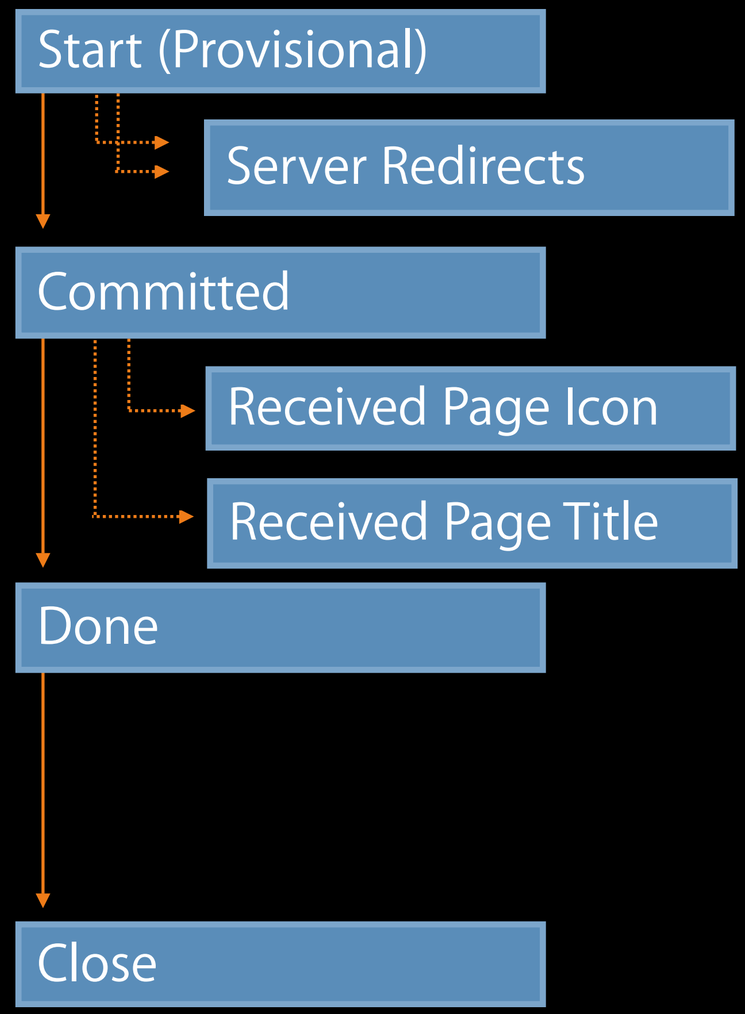
WebFrameLoadDelegate Sequence

- Tracks load progress of a document
  - Start (provisional)
  - Server redirects
  - Committed
  - Done
  - Close



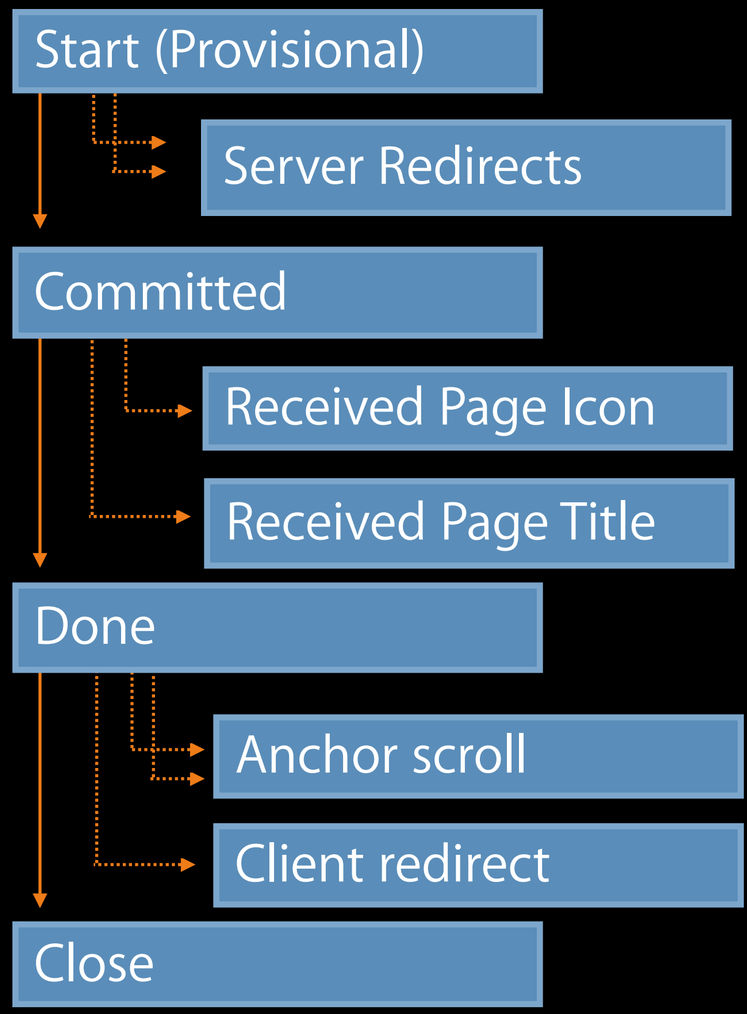
WebFrameLoadDelegate Sequence

- Tracks load progress of a document
  - Start (provisional)
  - Server redirects
  - Committed
  - Received page icon
  - Received page title
  - Done
  - Close



WebFrameLoadDelegate Sequence

- Tracks load progress of a document
  - Start (provisional)
  - Server redirects
  - Committed
  - Received page icon
  - Received page title
  - Done
  - Anchor scroll
  - Client redirects
  - Close



Code Example
Updating a URL field

```
// Your WebFrameLoadDelegate implementations:

// Called when provisional load has started.
- (void)webView:(WebView *)webView
    didStartProvisionalLoadForFrame:(WebFrame *)frame
{
    if ([webView mainFrame] == frame)
        [self showProvisionalURL];
}

// Called when provisional load has redirected.
- (void)webView:(WebView *)webView
didReceiveServerRedirectForProvisionalLoadForFrame:(WebFrame *)frame
{
    if ([webView mainFrame] == frame)
        [self showProvisionalURL];
}
```

Code Example

Updating a URL field

```
// Your WebFrameLoadDelegate implementations:

// Called when provisional load has failed.
- (void)webView:(WebView *)webView
    didFailProvisionalLoadWithError:(NSError *)error
    forFrame:(WebFrame *)frame
{
    if ([webView mainFrame] == frame)
        [self showCommittedURL];
}
// Called when the load has failed.
- (void)webView:(WebView *)webView
    didFailLoadWithError:(NSError *)error forFrame:(WebFrame *)frame
{
    if ([webView mainFrame] == frame)
        [self showCommittedURL];
}
```

Code Example

Updating a URL field

```
// Your WebFrameLoadDelegate implementations:

// Called when the load has completed successfully.
- (void)webView:(WebView *)webView
    didFinishLoadForFrame:(WebFrame *)frame
{
    if ([webView mainFrame] == frame)
        [self showCommittedURL];
}

// Called when a the frame has scrolled to an anchor.
- (void)webView:(WebView *)webView
    didChangeLocationWithinPageForFrame:(WebFrame *)frame
{
    if ([webView mainFrame] == frame)
        [self showCommittedURL];
}
```

Code Example

Updating a URL field

```
// Method that updates field with URL from provisional data source.
- (void)showProvisionalURL
{
    NSURL *URL = [[[frame provisionalDataSource] request] URL];
    [URLField setStringValue:[URL absoluteString]];
}

// Method that updates field with the final URL.
- (void)showCommittedURL
{
    NSURL *URL = [[[frame dataSource] request] URL];
    [URLField setStringValue:[URL absoluteString]];
}
```

Demo

Making a URL field work

Kevin Decker
Lover of HTML

http://developer.apple.com/wwdc2005/

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WebPolicyDelegate

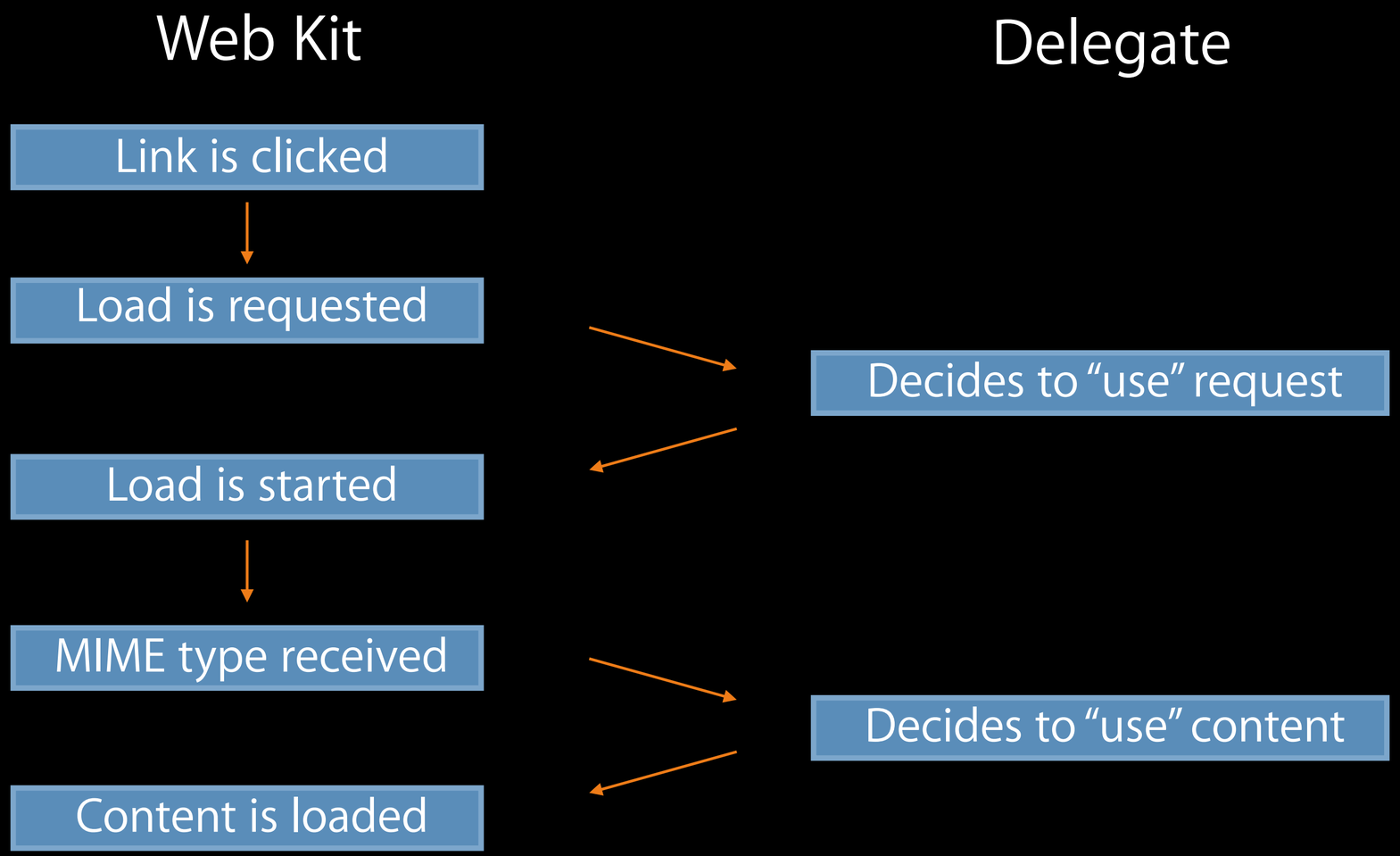
- Makes policy decisions for WebView navigation
- Three possible decisions
  - Use
  - Ignore
  - Download
- No need to decide right away
- Respond to listener object

WebPolicyDelegate

- Consulted
  - Before the load starts
  - Once MIME type is received
  - Before a new window is opened

WebPolicyDelegate

Sequence when a link is clicked



Code Example

Intercepting clicked links

```
// Your implementation of decidePolicyForNavigationAction.
- (void)webView:(WebView *)webView
    decidePolicyForNavigationAction:(NSDictionary *)action
    request:(NSURLRequest *)request
    frame:(WebFrame *)frame
    decisionListener:(id<WebPolicyDecisionListener>)listener
{
    // Get the action type.
    NSNumber *n = [action objectForKey:WebActionNavigationTypeKey];
    WebNavigationType actionType = [n intValue];
    if (actionType == WebNavigationTypeLinkClicked) {
        // Call ignore to prevent the link from loading.
        [listener ignore];
        // Then do your specialized action...
    } else {
        [listener use];
    }
}
```

Code Example

Downloading based on MIME type

```
// Your implementation of decidePolicyForMIMEType.
- (void)webView:(WebView *)webView
    decidePolicyForMIMEType:(NSString *)MIMEType
    request:(NSURLRequest *)request
    frame:(WebFrame *)frame
    decisionListener:(id<WebPolicyDecisionListener>)listener;
{
    // Download the request if WebView can’t handle the MIME type.
    if ([WebView canShowMIMEType:MIMEType]) {
        [listener use];
    } else {
        [listener download];
    }
}
```

Code Example

Very simple pop-up blocking

```
// Your implementation of decidePolicyForNewWindowAction.
- (void)webView:(WebView *)webView
    decidePolicyForNewWindowAction:(NSDictionary *)actionInformation
    request:(NSURLRequest *)request
    newFrameName:(NSString *)frameName
    decisionListener:(id<WebPolicyDecisionListener>)listener;

{
    // Prevent any new window from opening.
    [listener ignore];
}
```

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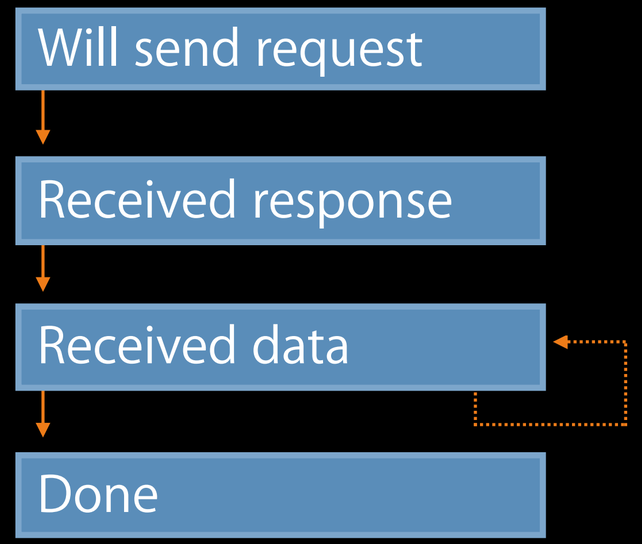
WebResourceLoadDelegate

- Informed of load progress of subresources
- Subresources are
  - Images
  - JavaScript
  - CSS
  - Plug-In content
  - etc.
- Can control which subresources get loaded

WebResourceLoadDelegate Sequence

- Progress messages
  - Will send request
  - Received response
  - Received data
  - Done



Code Example

Prevent all non-file URLs

```
// Called when resource load has started or redirected.
- (NSURLRequest *)webView:(WebView *)sender
    resource:(id)identifier
    willSendRequest:(NSURLRequest *)request
    redirectResponse:(NSURLResponse *)redirectResponse
    fromDataSource:(WebDataSource *)dataSource
{
    // If the URL is not a file URL, prevent it from loading.
    NSURL *URL = [request URL];
    if (![URL isFileURL]) {
        return nil;
    }
    return request;
}
```

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WebUIDelegate

- Manages window-related activity
- Shows JavaScript status text
- Presents JavaScript alerts
- Manages window chrome
- Customizes context menus
- Controls dragging

Code Example

Add a context menu item

```
// Called when a user control-clicks in a WebView.
- (NSArray *)webView:(WebView *)sender
    contextMenuItemsForElement:(NSDictionary *)element
    defaultMenuItems:(NSArray *)defaultMenuItems
{
    NSImage *image = [element objectForKey:WebElementImageKey];
    if (image != nil) {
        // Use clicked on an image. Add your menu item.
        NSMutableArray *items = [defaultMenuItems mutableCopy];
        NSMenuItem *item = [self openImageInPreviewMenuItem];
        [items addObject:item];
        return [items autorelease];
    }
    return defaultMenuItems;
}
```

Demo

Adding a context menu item

Kevin Decker
Yes, he's always like this

http://developer.apple.com/wwdc2005/

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WebUIDelegate and Dragging

- Gets called when dragging to and from
- Controls actions when dragging to a WebView
  - Loading
  - Editing
  - DHTML-defined
- Controls what is dragged from a WebView
  - Images
  - Links
  - Selection
  - DHTML-defined

WebUIDelegate Dragging API's

- "Destination" means dragging to a WebView
- "Source" means dragging from a WebView
- Delegate methods return bit masks

Code Example

Customize dragging to

```
// Called periodically as something is dragged over a WebView.
- (unsigned)webView:(WebView *)webView
    dragDestinationActionMaskForDraggingInfo:(id <NSDraggingInfo>)info
{
    // Allow accept drags that cause editing changes.
    return WebDragDestinationActionEdit;
}
```

Code Example

Customize dragging from

```
// Called when dragging starts from a WebView.
- (unsigned)webView:(WebView *)webView
    dragSourceActionMaskForPoint:(NSPoint)point;
{
    // Only images, links and selections dragged from a WebView.
    return WebDragSourceActionImage |
           WebDragSourceActionLink |
           WebDragSourceActionSelection;
}
```

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WebView Editing

- A WebView can be made editable
- Editing is WYSIWYG
- It can be used to
  - Compose HTML documents
  - Modify existing web pages
- Mail uses WebView editing in Tiger

Code Example

Enable Editing

```
[webView setEditable:YES];
// Yup, it’s that easy.
```

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WebEditingDelegate

- Called whether WebView is editable or not
- Called when the user
  - Makes selection changes
  - Modifies the document when editing is enabled
    - Adds content
    - Removes content
    - Changes styles
- Can prevent or modify how editing changes are made

Code Example

Disable selections

```
// Called whenever the selection is about to change.
- (BOOL)webView:(WebView *)webView
    shouldChangeSelectedDOMRange:(DOMRange *)currentRange
    toDOMRange:(DOMRange *)proposedRange
    affinity:(NSSelectionAffinity)selectionAffinity
    stillSelecting:(BOOL)flag
{
    return NO;
}
```

How Can I…

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Make a progress bar work with a WebView?

Change what happens when a link is clicked?

Add a context menu item?

Enable editing?

Print web content?

Load content from memory into a WebView?

Make a URL field update as I follow links?

Prevent WebView from loading certain URLs?

Customize dragging?

Prevent selection?

Save web content to disk?

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Printing Web Content

- Use NSPrintOperation
- Don’t pass the WebView to NSPrintOperation
- Pass the document view inside the WebView

Code Example

Printing web content

```
// NSDocument method.
- (void)printShowingPrintPanel:(BOOL)showPrintPanel
{
    // Get the document view.
    id view = [[[[webView mainFrame] frameView] documentView];

    // Create a NSPrintOperation with the view.
    NSPrintInfo *info = [self printInfo];
    NSPrintOperation *op = [NSPrintOperation printOperationWithView:view
        printInfo:info];
    [op setShowPanels:showPrintPanel];

    // Print it.
    [op runOperation];
}
```

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✓ Save web content to disk?

Saving Web Content

- WebDataSource holds all the loaded data
  - Main content data
  - Subresource data
- Two ways to save data
  - Just the main content data
  - Main content data plus all the subresource data

Main content

Everything

WebArchive

- New data type that holds
  - Main content data
  - Associated subresource data
- Allows you to view web content offline
- Can be used for
  - Saving all the data of a web page as one file
  - A pasteboard format

Code Example

Saving just the main content

```
- (void)savePage
{
    // Call the data method on WebDataSource.
    NSData *data = [[[webView mainFrame] dataSource] data];

    // Save it.
    NSString path = @”/tmp/demo.html”;
    [data writeToFile:path atomically:NO];
}
```

Code Example
Saving everything

```
- (void)saveArchive
{
    // Call the webArchive method on WebDataSource.
    WebArchive *archive = [[[webView mainFrame] dataSource] webArchive];

    // Save it.
    NSData *data = [archive data];
    NSString path = @”/tmp/demo.webarchive”;
    [data writeToFile:path atomically:NO];
}
```

Demo

Saving and editing a WebArchive

Kevin Decker
Here he goes again

http://developer.apple.com/wwdc2005/

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If You Have Any Questions

- Ask them right now during Q&A
- Join the webkitsdk-dev mailing list
  - http://lists.apple.com/

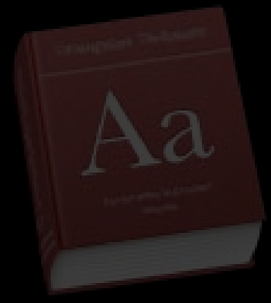
Web Kit Does Much More!

- Access to the DOM
- Add JavaScript classes
- Web Kit and Netscape Plug-Ins
- And more!

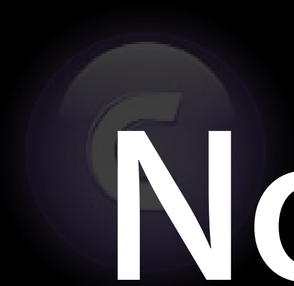
Advanced Web Kit Development	Session 129 Thursday 10:30 AM

Dashboard

Colloquy



Dictionary



Contribute

Safari

BumperCar

KidsBrowser

NetNewsWire

Mail

Now you can do it!

More Information

http://developer.apple.com/wwdc2005/

Documentation, Sample Code, and Other Resources

http://developer.apple.com/wwdc2005/

Related Sessions

Advanced Web Kit Development	Session 129 Thursday 10:30 AM
Safari for Web Designers	Session 135 Thursday 2:00 PM

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http://developer.apple.com/wwdc2005/

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Worldwide Developers Conference